CLAIMS

What is claimed is

1. A method of deinterlacing an input interlaced video stream having a plurality of fields to form an output progressive video stream having a plurality of frames, the method comprising:

calculating a plurality of field to field differences;

detecting a selected special pattern in the plurality of field to field differences;

classifying the input interlaced video stream based on detection of the selected special pattern;

performing special mode deinterlacing when the input interlaced video stream is classified as a special mode video stream; and

performing normal mode deinterlacing when the input interlaced video stream is classified as normal mode video stream.

2. The method of Claim 1, wherein the performing special mode deinterlacing when the input interlaced video stream is classified as special mode, comprises merging two fields from the input interlaced video stream to form a frame of the output progressive video stream.

3. The method of Claim 2, wherein the merging two fields from the input interlaced video stream to form a frame of the output progressive video stream, comprises merging a current field with a late field, wherein the late field follows the current field in the interlaced video stream.

4. The method of Claim 2, wherein the merging two fields from the input interlaced video stream to form a frame of the output progressive video stream, comprises merging a current field

with an early field, wherein the current field follows the early field in the interlaced video stream.

5. The method of Claim 1, wherein the performing normal mode deinterlacing when the input interlaced video stream is classified as normal mode comprises repeating each scan lines in a current field to form a frame.

6. The method of Claim 1, wherein the performing normal mode deinterlacing when the input interlaced video stream is classified as normal mode comprises interpolating two scan lines of a field to form a missing scan line.

7. The method of Claim 1, wherein the classifying the input interlaced video stream based on detection of the selected special pattern comprises:

incrementing an enter special mode counter when the selected special pattern is detected;

classifying the input interlaced video stream as special mode when the enter special mode counter equals a special mode threshold.

8. The method of Claim 7, wherein the classifying the input interlaced video stream based on detection of the selected special pattern comprises:

incrementing an exit special mode counter when the selected special pattern is not detected;

classifying the input interlaced video stream as normal mode when the exit special mode counter equals an exit special mode threshold.

9. The method of Claim 1, wherein the detecting a selected special pattern in the plurality of field to field differences comprises determining whether a first field to field difference of the plurality of field to field differences is smaller than each member of a first subset of the plurality of field to field differences.

10. The method of Claim 1, wherein the detecting a selected special pattern in the plurality of field to field differences further comprises determining whether a second field to field difference of the plurality of field to field differences is smaller than each member of a second subset of the plurality of field to field differences.

11. The method of Claim 1, wherein the detecting a selected special pattern in the plurality of field to field differences further comprises:

  detecting a partial special pattern in the plurality of field to field differences, wherein the partial special pattern is a subset of the selected special pattern; and

  determining whether additional field to field differences match a remaining special pattern; wherein the remaining special pattern is a subset of the selected special pattern.

12. The method of Claim 1, wherein the calculating a plurality of field to field differences comprises:

  calculating an absolute difference between each pixel of a subset of pixels of a first field with a corresponding pixel of a second field to form a plurality of absolute differences for the first field;

summing each absolute difference to generate a field to field difference for the first field.

13. The method of Claim 1, wherein the subset of pixels of a first field contains all the pixels of the first field.

14. The method of Claim 1, wherein the calculating a plurality of field to field differences comprises:

calculating an absolute difference between each pixel of a subset of pixels of a first field with a corresponding pixel of a second field to form a plurality of absolute differences for the first field;

comparing each absolute difference with a difference threshold;

summing each absolute difference greater than the difference threshold to generate a field to field difference for the first field.

15. The method of Claim 1, wherein the calculating a plurality of field to field differences comprises:

calculating an absolute difference between each pixel of a subset of pixels of a first field with a corresponding pixel of a second field to form a plurality of absolute differences for the first field;

comparing each absolute difference with a difference threshold;

incrementing a field to field difference for the first field by one for each absolute difference greater than the difference threshold.

16. A deinterlacer for deinterlacing an input interlaced video stream having a plurality of fields to form an output

progressive video stream having a plurality of frames, the
deinterlacer comprising:

a buffer coupled to receive the input interlaced video
stream;

a mode detector coupled to the buffer and configured to
detect whether the input interlaced video stream is in a
special mode; and

a field merging and conversion unit coupled to the
buffer and the mode detector and configured by the mode
detector to perform special mode deinterlacing when the input
interlaced video stream is in the special mode and to perform
normal mode deinterlacing when the input interlaced video
stream is in a normal mode.

17. The deinterlacer of Claim 16, wherein the buffer
comprises:

a first field buffer;

a second field buffer; and

a third field buffer.

18. The deinterlacer of Claim 17, wherein the buffer is
configured to operate as a circular buffer.

19. The deinterlacer of Claim 16, wherein the mode detector
comprises:

a field difference calculation unit coupled to the
buffer; and

a field to field difference FIFO coupled to the field
difference calculation unit.

20. The deinterlacer of Claim 19, wherein the field
difference calculation unit is configured to calculate a field to

field difference of an early field in the buffer and a late field in the buffer.

21.   The deinterlacer of Claim 20, wherein the field difference calculation unit is configured to store the field to field difference in the field to field difference FIFO.

22.   The deinterlacer of Claim 19, wherein the mode detector further comprises a special pattern detector coupled to the field to field difference FIFO and configured to detect a selected special patter in the field to field difference FIFO.

23.   The deinterlacer of Claim 22, wherein the mode detector further comprises a further comprising a mode detector control unit coupled to the field to field difference FIFO, the special pattern detector, and the field merging and conversion unit.

24.   The deinterlacer of Claim 23, wherein the mode detector control unit is configured to determine whether the input interlaced video stream is a special mode video stream.

25.   The deinterlacer of Claim 24, wherein the mode detector control unit configures the field merging and conversion unit to perform special mode deinterlacing when the input interlaced video stream is a special mode video stream.

26.   The deinterlacer of Claim 25, wherein the mode detector control unit configures the field merging and conversion unit to perform normal mode deinterlacing when the input interlaced video stream not a special mode video stream.

27. A system for deinterlacing an input interlaced video stream having a plurality of fields to form an output progressive video stream having a plurality of frames, the system comprising:

means for calculating a plurality of field to field differences;

means for detecting a selected special pattern in the plurality of field to field differences;

means for classifying the input interlaced video stream based on detection of the selected special pattern;

means for performing special mode deinterlacing when the input interlaced video stream is classified as a special mode video stream; and

means for performing normal mode deinterlacing when the input interlaced video stream is classified as normal mode video stream.

28. The system of Claim 27, wherein the means for performing special mode deinterlacing when the input interlaced video stream is classified as special mode, comprises means for merging two fields from the input interlaced video stream to form a frame of the output progressive video stream.

29. The system of Claim 28, wherein the means for merging two fields from the input interlaced video stream to form a frame of the output progressive video stream, comprises means for merging a current field with a late field, wherein the late field follows the current field in the interlaced video stream.

30. The system of Claim 28, wherein the means for merging two fields from the input interlaced video stream to form a frame of the output progressive video stream, comprises means for

merging a current field with an early field, wherein the current field follows the early field in the interlaced video stream.

31.   The system of Claim 27, wherein the means for classifying the input interlaced video stream based on detection of the selected special pattern comprises:

  means for incrementing an enter special mode counter when the selected special pattern is detected;

  means for classifying the input interlaced video stream as special mode when the enter special mode counter equals a special mode threshold.

32.   The system of Claim 31, wherein the means for classifying the input interlaced video stream based on detection of the selected special pattern comprises:

  means for incrementing an exit special mode counter when the selected special pattern is not detected;

  means for classifying the input interlaced video stream as normal mode when the exit special mode counter equals an exit special mode threshold.

33.   The system of Claim 27, wherein the means for detecting a selected special pattern in the plurality of field to field differences comprises means for determining whether a first field to field difference of the plurality of field to field differences is smaller than each member of a first subset of the plurality of field to field differences.

34.   The system of Claim 27, wherein the means for detecting a selected special pattern in the plurality of field to field differences further comprises means for determining whether a second field to field difference of the plurality of field to

field differences is smaller than each member of a second subset of the plurality of field to field differences.

35. The system of Claim 27, wherein the means for detecting a selected special pattern in the plurality of field to field differences further comprises:

means for detecting a partial special pattern in the plurality of field to field differences, wherein the partial special pattern is a subset of the selected special pattern; and

means for determining whether additional field to field differences match a remaining special pattern; wherein the remaining special pattern is a subset of the selected special pattern.

36. The system of Claim 27, wherein the means for calculating a plurality of field to field differences comprises:

means for calculating an absolute difference between each pixel of a subset of pixels of a first field with a corresponding pixel of a second field to form a plurality of absolute differences for the first field;

means for summing each absolute difference to generate a field to field difference for the first field.

37. The system of Claim 27, wherein the means for calculating a plurality of field to field differences comprises:

means for calculating an absolute difference between each pixel of a subset of pixels of a first field with a corresponding pixel of a second field to form a plurality of absolute differences for the first field;

means for comparing each absolute difference with a difference threshold;

means for summing each absolute difference greater than the difference threshold to generate a field to field difference for the first field.

38.   The system of Claim 27, wherein the means for calculating a plurality of field to field differences comprises:

means for calculating an absolute difference between each pixel of a subset of pixels of a first field with a corresponding pixel of a second field to form a plurality of absolute differences for the first field;

means for comparing each absolute difference with a difference threshold;

means for incrementing a field to field difference for the first field by one for each absolute difference greater than the difference threshold.